PHASE SPACE DYNAMICS OF HEAVY ION NUCLEAR COLLISIONS IN THE FERMI ENERGY DOMAIN

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A decomposition of the nuclear one-body density distribution on a coherent state basis is shown to provide the adequate initial conditions for dynamical studies of heavy ion reactions /1-5/. The full three-dimension Vlasov equation is solved and shows the transparency effects expected from pure mean field theories (see also the TDHF results quoted in ref. /7/). An extension of the Vlasov equation (the Landau-Vlasov equation) by inclusion of a collision term - according to the Uehling-Uhlenbeck prescription - substancially reduces these transparency effects. The Landau-Vlasov equation describes a transition between the compound nucleus formation and the fragmentation-like reactions in the intermediate energy range. Linear momentum transfer exhibits a double-humped distribution. For peripherical reactions, at increasing incident energies, the model describes a process such as the correlation between the quasi-projectile and quasi-target masses could support an abrasion picture /6/. Such calculations allow to describe the relaxations of the momentum distributions and of the pressure tensors, which enlightens the equilibration processes in nuclear matter. Some of these results are illustrated in a film where the time evolution of density profiles for three typical reactions are displayed /8/.

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